TRANSLATION OF THE OPERATING INSTRUCTIONS

KVT 3.60/3.80/3.100/3.140
KVX 3.60/3.80/3.100/3.140
PICCHIO 2200
ROTARY VANE VACUUM PUMPS

dry-running

MAKE IT BECKER.

Instructions also for units with

VARIAIR UNIT

BECKER

Important information for the user of the operating instructions

We reserve the right to make technical changes and additions to the operating instructions.

No liability is assumed for the content, in particular for damage caused by existing, non-existent or incorrect information.

The distribution of these operating instructions is not permitted unless expressly authorised.

Operating instructions valid for:

General designation	Rotary vane vacuum pump, hereinafter described as "pump".
Product type	dry-running
Model	KVT 3.60/3.80/3.100/3.140 KVX 3.60/3.80/3.100/3.140 PICCHIO 2200 VARIAIR KVT 3.80/3.100/3.140
Manufacturer	**Gebr. Becker GmbH** Hölker Feld 29-31 42279 Wuppertal

Contents

1 TO THE OPERATING INSTRUCTIONS

1.1 GENERAL INFORMATION

These operating instructions are an integral part of the pump and contain the necessary information and important instructions for operating the pump safely and properly. Observing them will help:

- Avoid dangers
- Reduce repair costs and downtime
- increase the reliability and service life of the product

It is the responsibility of the operator to ensure the availability of this document. This applies in particular if the document is lost.

All persons working on the pump must have read and understood the operating manual and these operating instructions.

NOTE

For a detailed description of the safety instructions, see chapter 2 "Basic safety instructions".

1.2 STRUCTURE OF THE SAFETY INSTRUCTIONS

Safety instructions are identified by a pictogram and a signal word. The following signal words are used to indicate dangers, prohibitions and important information:

DANGER

This signal word indicates an imminent danger that could result in serious injury or even death.

WARNING

This signal word indicates a potentially imminent danger that could result in serious injury or even death.

CAUTION

This signal word indicates a potentially imminent danger that could result in minor or serious injuries.

ATTENTION

This signal word indicates a potentially imminent danger that could result in material damage.

NOTE

This symbol indicates tips, recommendations and further information.

1.3 SAFETY SYMBOLS

Warning sign:


General warning sign


Warning of hand injuries


Warning of hot surfaces


Warning of automatic start-up


Risk of slipping


Tripping hazard


Warning of electrical voltage

Commandment sign:


Attention


Use foot protection


Use hand protection

 Use hearing protection

 Use eye protection

 Use a protective mask

Note:

X-Series

General information

1.4 ADDITIONAL DOCUMENTATION

In addition to these operating instructions, the following documents and instructions must be observed:

- Safety symbols according to chapter 1.3 on the pump and on hazardous material containers
- Regulations on accident prevention, occupational safety and environmental protection
- Operating instructions and documents for components, assemblies and aids provided by third-party manufacturers.
- Spare parts lists
- Data sheets

1.5 WARRANTY AND LIABILITY

Warranty and liability claims for personal injury or damage to property are invalid if

- Failure to observe the instructions for transport and installation;
- improper use (misuse) or improper operation;
- Failure to observe the operating instructions and the instructions contained therein;
- improper or non-executed maintenance and servicing work;
- incorrect installation, commissioning, maintenance, servicing and cleaning;
- Use of unauthorised operating materials, lubricants or spare parts;
- defective, incorrectly installed or dismantled protective devices;
- inadequate monitoring of pump parts subject to wear;
- Use of externally procured equipment that has not been approved by the manufacturer;
- improper disassembly;

1.6 MODIFICATIONS AND CONVERSIONS

Modifications or conversions are prohibited without written authorisation from the manufacturer and are therefore excluded.

NOTE

Description of the safety instructions. See chapter 2.9 "Safety instructions"

2 BASIC SAFETY INSTRUCTIONS

These operating instructions serve as a basis for the safe use and operation of the pump. The operating instructions, in particular the safety instructions and the rules and regulations applicable to the place of use, must be observed by all persons working on or with the pump.

Furthermore, the generally applicable legal and other rules and regulations for accident prevention (e.g. personal protective equipment) and environmental protection must be observed.

NOTE

Some activities on the pump require compliance with special safety regulations. These safety instructions can be found in the respective chapters of these operating instructions.

NOTE

The operating instructions must always be kept at the place of use and must be freely accessible to all persons working with the pump.

The instructions of the occupational safety specialist and the instructions from the briefings must be followed at all times.

The pump is only intended for the intended use described in the chapter 2.5.

The pump must not be used for purposes other than those for which it is intended.

All work on the pump may only be carried out by qualified and trained personnel (see chapter 2.4 "Personnel qualifications").

The safety instructions given in chapter 2.9 must be observed for all work on the pump.

2.1 PROVISION

The pump is a machine within the meaning of the Machinery Directive 2006/42/EC Art 2a.

The pump conforms to the health and safety requirements of the Machinery Directive 2006/42/EC.

The pump may only be used once the operator has determined that the pump is installed in accordance with the state of the art.

This is fulfilled if, among other things, the operating conditions listed in these operating instructions in accordance with Directive 2006/42/EC Annex 1 Para. 1.7.4.2.i have been fully implemented.

2.2 OBLIGATIONS OF THE OPERATOR

The operator undertakes to only allow persons to work on the pump who

- are familiar with the basic occupational safety and accident prevention regulations;
- were instructed for the activities on the pump;
- have read and understood these operating instructions before carrying out any work on the pump;
- have reached the legal minimum age;
- are fit for use;
- are rested and not under the influence of drugs or medication;
- reliably fulfil the work assigned.

In addition, the operator must train staff at regular intervals and inform them about the hazards.

The personnel of the operating company must be permanently committed to safe working practices and informed about the dangers and risks of the pump. This applies in particular to the safety instructions.

The operator must provide the personnel with the necessary protective equipment.

2.3 OBLIGATIONS OF THE STAFF

All persons who are commissioned to work on the pump are obliged, before starting work, to

- to observe the basic regulations on occupational safety and accident prevention and
- to read and observe these operating instructions.

NOTE

Only persons who have read and understood these operating instructions may carry out work on and with the pump!

2.4 PERSONNEL QUALIFICATION

Certain activities require the personnel carrying out the work to have certain qualifications. The following table summarises these qualifications:

Activity	Minimum qualification of personnel	
	Instructed persons with specialist training	Instructed operating personnel
Commissioning	x	
Maintenance & Servicing	x	
Operation		x
Disassembly	x	
Symbol "x" approved personnel		

2.5 INTENDED USE

The operational safety of the pump is only guaranteed if it is used as intended. Intended use also includes observing the operating instructions for this product and any components, as well as carrying out all maintenance and service work.

The pump may only be used as intended in accordance with the machine description and the technical data.

The intended use is summarised below:

- The pump evacuates air to a vacuum in accordance with chapter 9.2
- Conveying any other gases, in particular hazardous substances, is not permitted and prohibited.
- The permissible technical parameters must be complied with.
- The pump must not be operated in potentially explosive atmospheres.
- The pump must be protected from the weather.
- The manufacturer must be consulted for any operation outside the technical parameters specified in the product data sheet.

ATTENTION

Only use the pump for its intended purpose and in a technically safe condition!

This is the only way to guarantee the operational safety of the pump!

2.6 UNAUTHORISED USE

The incorrect applications listed below are not permitted and pose a risk to people and machinery. In particular

- the evacuation of hazardous substances, in particular flammable, explosive or toxic gases
- use in potentially explosive environments (explosive gas/vapour/mist/air mixtures or dust/air mixtures or hybrid mixtures of air and flammable substances)
- Use of the pump in non-commercial applications
- operating the pump when it is not fully assembled
- a setup in which the pump is subjected to dynamic loads. Please contact Beckerservice if you have any questions.

2.7 PROTECTIVE MEASURES FOR USERS

Personal protective equipment must be worn when working on the pump in order to minimise health hazards.

The protective equipment required for the respective work must always be worn during work.

Instructions on personal protective equipment displayed in the work area must be followed.

WARNING

Risk of injury to hands due to crushing, cutting and high temperatures

Hand protection in accordance with the glove plan must be worn during all work on the pump.

NOTE

The hand protection must be provided by the operator, must be suitable for the activities to be carried out and must comply with the applicable standards (e.g. EN 388).

WARNING

Risk of injury to feet from crushing and falling objects

Foot protection must be worn during all work on the pump.

NOTE

The foot protection must be provided by the operator, must be suitable for the activities to be carried out and must comply with the applicable standards (e.g. DIN EN ISO 20345).

WARNING

Hearing damage due to high volume

Hearing protection must be worn during activities that must be carried out while the pump is running.

NOTE

Hearing protection must be provided by the operator, must be suitable for the noise levels generated and must comply with the applicable standards (e.g. DIN EN 352).

WARNING

Eye injuries due to flying particles

Eye protection must be worn during all cleaning work on the pump.

NOTE

Eye protection must be provided by the operator, must be suitable for the activities to be carried out and must comply with the applicable standards (e.g. EN 166).

WARNING

Health damage to the respiratory tract caused by pollutants and particles

Respiratory protection must be worn during all cleaning work on the pump.

NOTE

Respiratory protection must be provided by the operator, must be suitable for the resulting air pollution and must comply with the applicable standards (e.g. DIN EN 143, filter class FFP2).

2.8 INFORMATION ON RESIDUAL RISKS

The pump is built in accordance with the current state of the art and recognised safety regulations. When using the pump, health hazards for persons working directly with the pump and third parties cannot be ruled out.

2.9 SAFETY INSTRUCTIONS

The dangers and risks in the respective life phases of the pump are described below. The following hazard warnings must be observed.

DANGER

Danger to life due to electric shock

Personnel qualification

Work and tasks on the electrical system may only be carried out by qualified electricians who can demonstrate that they have successfully completed recognised training in the relevant specialist area and have been instructed in the special technical features of the pump.

Without exception, persons who do not fulfil the above conditions are prohibited from carrying out electrical work, including the simplest auxiliary activities.

To carry out tasks and activities on the electrical system of the pump, work must be carried out in accordance with the five safety rules as per DIN VDE 0105.

DANGER

Danger to life due to electric shock

Measures in the event of damage to the electrical installation

Damage to the electrical installation and contact with live parts can be life-threatening.

The following measures are therefore mandatory:

- In the event of damage to the electrical installation, switch off the pump immediately and inform the responsible organisation.
- Repairs must be carried out by a qualified electrician.

DANGER

Danger to life due to unexpected start-up

Countermeasures

The following steps must be followed when preparing for servicing and maintenance work:

1. Switch off the pump and all attached assemblies.
2. Disconnect the pump from the supply voltage and proceed in accordance with the five safety rules (VDE105).
3. Disconnect the pump from the air supply.

DANGER

Fire and danger to life due to insufficient distance to neighbouring parts

If the pump is enclosed, minimum distances to the product must be maintained to prevent potential fires.

Information on minimum distances can be found in chapter 6 "Installation and commissioning".

DANGER

Danger to life due to arcing and creepage distance when disconnecting plug connections

Always switch off the power supply before disconnecting plug connections.

DANGER

Danger to life due to defective, dismantled and manipulated protective devices

The pump may only be operated if all safety and protective devices are in place and fully functional!

Faulty safety and protective equipment can lead to dangerous situations!

For this reason:

1. Switch off the pump immediately,
2. Secure against restarting and
3. Disconnect from air supply and electrical power!

WARNING

Risk of injury! Risk of crushing in the hand and arm area due to product assembly

If assembly work is carried out, the employee must be trained in the use of lifting equipment and have provided proof of this. Use suitable protective equipment!

WARNING

Risk of injury due to incorrect lifting conditions

If assembly work is carried out, the employee must be trained in the use of lifting equipment and have provided proof of this.

The pump may only be lifted in accordance with the specifications (see chapter 5 "Transport").

WARNING

Safety risk when leaving the operating parameters

Safe operation of the pump can no longer be guaranteed outside the permitted operating parameters. The limits of the permissible operating parameters are shown in the chapter 9.2.

WARNING

Safety risk due to spare parts not approved by the manufacturer

Gebr. Becker Spare parts have been checked by us for their technical requirements and safety.

Unapproved spare parts can pose a danger to people and the pump.

WARNING

Danger from hot components and equipment

Media and pump parts can reach high temperatures during operation. Before intervening manually in the pump, it is therefore necessary to wait until it has cooled down before working safely with protective gloves to avoid burns and scalding.

WARNING

Risk of injury due to stored residual energy

The occurrence of residual mechanical, pneumatic and electrical energy on the pump after actuating the operating element for stopping in an emergency or after switching off the pump must be taken into account!

WARNING

Risk of injury due to slipping, tripping and falling

The operator of the pump is responsible for traffic safety. If operating fluids leak from the pump, the areas must be cordoned off and labelled accordingly and suitable measures must be taken.

NOTE

Wear safety shoes

Foot protection must be worn during all work on the pump.

NOTE

Wear protective gloves

The pump must be allowed to cool down until it is safe to carry out work with protective gloves.

If this time cannot be guaranteed, protective gloves with adequate heat protection must be used. The exact model can be found in the operator's glove plan.

2.10 BEHAVIOUR IN THE EVENT OF DANGER AND ACCIDENTS

The protective measures to be taken and the responsibility for drawing up an occupational safety concept lie with the operator of the workplace.

The operator must ensure safe use through the "Operating conditions" described in chapter 3.

2.11 REQUIREMENTS FOR STABILITY

The pump fulfils the stability requirements in accordance with DIN EN 1012-1 (compressors) or DIN EN 1012-2 (vacuum pumps) depending on the application.

Further information on installation is described in chapter 6.1 "General requirements".

2.12 OCCUPATIONAL SAFETY

The pump has been set up in accordance with the Machinery Directive 2006/42/EC and the relevant health and safety and accident prevention regulations. Before starting repair work, the pump must be de-energised and depressurised to prevent accidents. Previously removed protective devices must be refitted before commissioning.

2.13 AIRBORNE NOISE EMISSIONS

According to Directive 2006/42/EC, information on the airborne noise emission of the pump must be provided. Detailed information can be found in the Machinery Directive under point 1.7.4.2.

Information on the pump in this regard can be found in the chapter 9.2 "Operating parameters".

2.14 ERGONOMICS

With regard to maintenance and servicing, special behaviour with regard to ergonomics must be taken into account in accordance with Directive 2006/42/EC Annex i 1.1.6 "Ergonomics"

3 OPERATING CONDITIONS

The CE conformity of the product only becomes legally valid when all product safety requirements of the "operating conditions" formulated in this chapter within the meaning of Directive 2006/42/EC Annex I 1.7.4.2.i have been fully realised by the operator. Only in this case is CE conformity valid and the pump may be operated.

Operating condition 1: Safety instructions for maintenance work

1. **Standalone products - not implemented in a control system**

   Shutting down the pump during maintenance

   In the event of maintenance, work must be carried out with the guards dismantled. This work may only be carried out when the pump is at a standstill. In order to ensure the safe standstill of the pump, the pump must be disconnected from the electrical supply and the five safety rules according to DIN VDE 0105 must be obligatorily observed.

2. **Implemented products - product is controlled via control of the operator**

   If the pump is implemented in a control system by the operator, the following conditions apply to the "Maintenance" operating mode:

   - The drive must be disconnected from the power supply
   - Or, in the case of a shutdown stored in the control system, comply with the requirements of DIN EN 61800-1.

Operating condition 2: Ventilation of the operating room

The operator must ensure that the operating room of the pump is sufficiently ventilated.

Operating condition 3: Electrical protection of the motor

The motor must be protected according to the state of the art. It must be protected at least by a suitable protective device in accordance with DIN EN 60204-1.

The maximum permissible operating temperature can be exceeded due to a failure of the motor ventilation, dirt or other environmental influences.

Operating condition 4: Ensuring cooling

The volume flow of the cooling must be guaranteed unhindered on the intake side as well as on the exhaust air side.

Contamination (dust in the operating room) can lead to deposits on the pump, which can impair cooling. The operator must ensure that the pump is cleaned regularly.

Operating condition 5: Ensuring unobstructed exhaust air

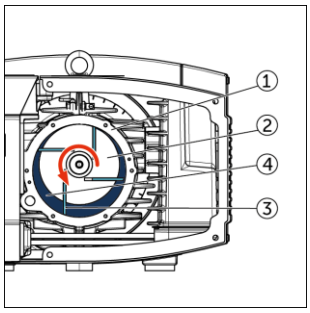
As standard, the evacuated air is discharged into the environment via the blow-off valve. Optionally, the exhaust air can be discharged via a connected exhaust air duct. As the blow-off valve is not used as a safety element in this case, it is essential to ensure that the exhaust air can flow through the exhaust air duct unhindered and without significant back pressure (<100 mbar).

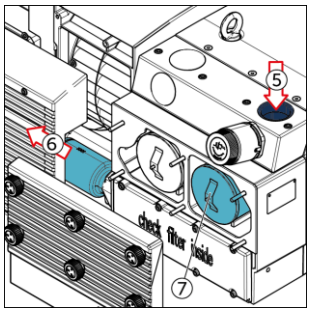
4 PUMP DESCRIPTION

This chapter explains the assemblies and components of the pump and how they work.

The following information is intended to help you understand the operation of the pump. This information can help to avoid dangers and errors due to incorrect operation.

4.1 GENERAL DESCRIPTION OF THE PUMP





The pump is a dry-running rotary vane vacuum pump.

It consists of a housing (1), the eccentrically installed rotor (2), the radially movable vanes (3) and the inlet and outlet (5+6).

When the rotor turns, gas flows through the intake filter (7) into the expanding chamber (4) until it is shut off by the next slide valve. The trapped gas is then compressed until the blow-off valve (6) opens against atmospheric pressure.

4.2 SIZES

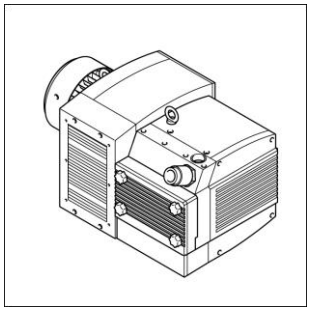
Several pumps of different sizes are listed in these operating instructions, as they

- work according to the same active principle,
- have the same intended use,
- are subject to the same legal and standardisation requirements,
- have a similar design,
- have similar physical characteristics,
- and are also very similar in terms of maintenance, service and commissioning.

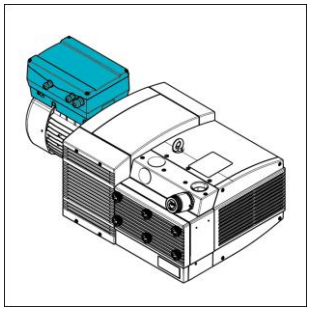
4.3 VARIANTS

4.3.1 VARIANTS KVT 3.60-3.140

Within the KVT 3.60-3.140 series, a distinction is made between the following variants.



KVT 3.XXX (standard) + PICCHIO 2200



VARIAIR KVT 3.XXX

The Picchio 2200 is a special version with a larger suction chamber for more suction volume.

The VARIAIR pumps are a variant with a frequency inverter.

Note on the series

The integrated frequency inverter adapts the pump's performance data to demand.

The energy requirement is optimised and operation within the approved

characteristic map is guaranteed.

The "gentle" start-up of the pumps reduces the load on the mechanical components and extends the service life.

Sizes	Variants		
	Standard	With frequency inverter (VARIAIR)	Special variant
KVT 3.60	x		
KVT 3.80	x	x	PICCHIO 2200
KVT 3.100	x	x	
KVT 3.140	x	x	

Table: Sizes KVT 3.60-3.140

4.3.2 VARIANTS KVX 3.60-3.140

NOTE

The X series with specially developed sliders achieves improved slider service life due to less abrasion.

NOTE

The intake filters installed in the X series have a removable cover (pre-filter), which extends the service life of the filters when cleaned regularly.

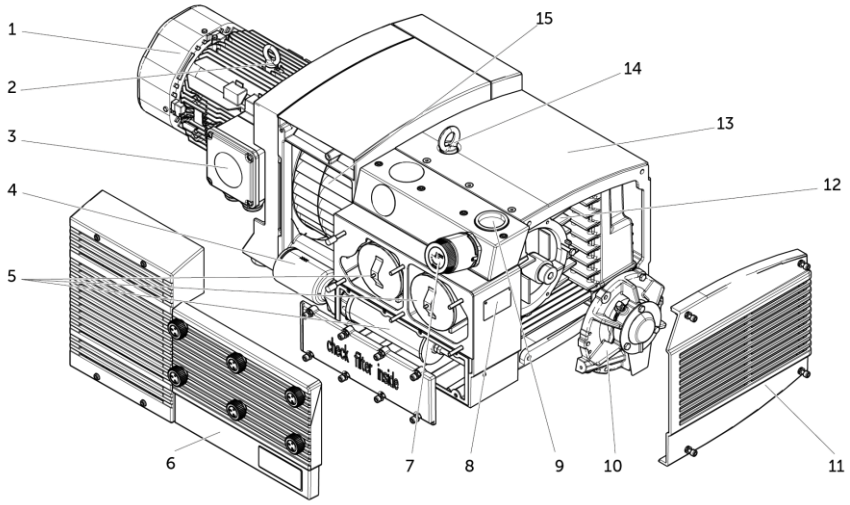
NOTE

Gebr. Becker guarantees a valve service life of 20,000 operating hours or a maximum of 3 years for this pump. The earlier point in time is decisive here.

Sizes	Variants	
	Standard	With frequency inverter (VARIAIR)
KVX 3.60	x	
KVX 3.80	x	x
KVX 3.100	x	x
KVX 3.140	x	x

Table: Sizes KVX 3.60-3.140

4.4 COMPONENTS



Position	Component	Function
1	Engine	Drive
2	Eyebolt/transport lugs	Attachment points
3	Terminal box with motor rating plate	Electrical connection; conformity markings and technical data - Motor
4	Blow-off valve	Outlet of evacuated air, vacuum safety device
5	Filter group	Air filtration
6	Filter cover	Closure of the filter housing
7	Vacuum regulating valve	Setting the required vacuum
8	Device type plate	Conformity markings and technical data - Pump
9	Admission	Connection of the vacuum line
10	Side cover	Lateral closure of the pump housing, bearing
11	Air guiding bonnet	Flow optimisation, contact protection
12	Pump unit	The pump unit includes pump housing, piston and slider
13	Covering bonnet	Flow optimisation, contact protection
14	Eyebolt	Attachment point
15	Fan	Cooling, motor coupling

Table: Components

4.5 MOTORS

The characteristics of the motor used can be found on the motor rating plate.

4.6 SAFETY AND PROTECTIVE EQUIPMENT

DANGER

Danger to life due to defective, dismantled and manipulated protective devices

NOTE

For a detailed description of the safety instructions, see chapter 2 "Basic safety instructions".

The pump's protective devices must not be dismantled, modified or put out of operation. The pump must be shut down and secured immediately if any protective devices have been removed, modified or taken out of operation.

Defects in protective devices must be rectified immediately. All protective devices must be undamaged, fully assembled and functional. Warning and information signs must be clearly visible.

All protective devices must be checked for functionality, damage and completeness after each maintenance of the pump.

If a maintenance activity requires the dismantling of protective devices, these may only be dismantled for the duration of the maintenance activity. Immediately after completion of the maintenance work, all protective devices must be fully installed at the intended location and checked for proper functioning.

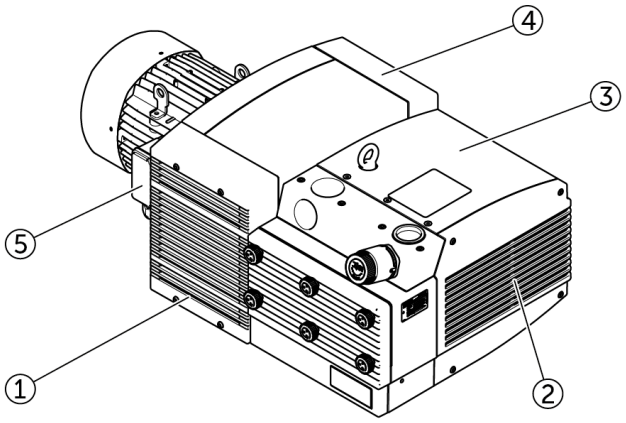
The prescribed inspection intervals for protective devices must be observed and complied with. Protective devices may only be maintained, replaced and serviced by trained, instructed and authorised specialist personnel.

Unauthorised tampering with or manipulation of the safety-related parts of the pump is strictly prohibited and must be reported immediately to the responsible department.

All safety and accident prevention equipment, such as warning and information signs, covers, protective panelling, etc., must be in place. The removal or modification of these devices is prohibited.

Damaged equipment must be repaired immediately.

An overview of the pump with the designations of the protective devices is shown below.



Position	Component	Location
1	Fan cowl	Left fan cover
2	Air guiding bonnet	Front cover of the pump unit
3	Covering bonnet	Side and top cover of the pump unit
4	Fan cowl	Right fan cover
5	Terminal box cover	Cover side of the terminal box

Table: Protective devices

4.7 TESTING THE SAFETY AND PROTECTIVE EQUIPMENT

NOTE

All safety and protective equipment must be checked regularly.

For maintenance intervals, see chapter 8.1

The condition and function of safety and protective equipment must be checked if:

- modifications and repairs have been carried out on the pump
- Damage has occurred to the pump
- service and maintenance intervals are to be carried out

5 TRANSPORT

WARNING

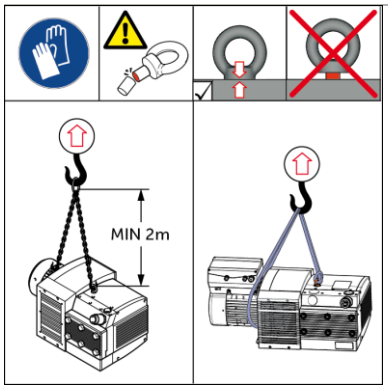
Risk of injury due to incorrect lifting conditions

NOTE

For a detailed description of the safety instructions, see chapter 2 "Basic safety instructions".

NOTE

Wear suitable PPE



The pump may only be attached to the eyebolt/lifting eye. The following must be observed:

Select the hoist according to the total weight to be transported. See chapter 9.2 (operating parameter weights)

- Chain length at least 2 m (minimise spreading angle).
- Secure the pump against tipping and falling.
- Always suspend the pump from at least 2 load suspension devices.
- Always screw in the eyebolt as far as it will go.
- Do not stand under suspended loads.

For some sizes/variants, the transport lugs on the motor are difficult to access or not available. In this case, a transport strap should be placed around the motor as close as possible to the pump housing so that the pump is well balanced during transport.

6 INSTALLATION AND COMMISSIONING

6.1 GENERAL REQUIREMENTS

The pump must be installed horizontally on a level surface.

The installation location of the pump should be dry and protected from splashing water.

We recommend setting up the pump so that maintenance work can be carried out easily. Depending on the type of variant or accessories fitted, additional clearance may be required for this.

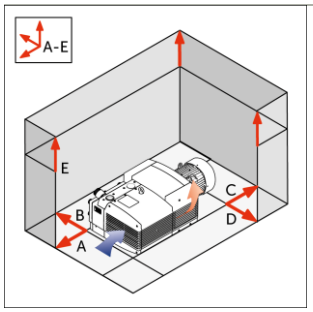
The following points must be observed when installing components and assemblies in order to avoid injuries and damage to the pump:

- Components from third-party manufacturers may only be installed if they have been approved by the manufacturer and comply with the directives and laws applicable in the country of use.
- Loose and non-pump parts must be removed from the pump environment after installation.
- Protruding parts (pipes, cables, etc.) must be properly installed, laid and labelled.
- Contact points of components must be clean and intact.

ATTENTION

Compliance with the minimum distance

The minimum distance between the pump and all neighbouring parts must be observed in accordance with the following table. Failure to observe the minimum distances can lead to a fire risk due to the high level of heat emitted.



A	B	C	D	E
10 cm	10 cm	10 cm	10 cm	10 cm

Table: Minimum distances

ATTENTION

Comply with operating parameters

Safe operation of the pump can no longer be guaranteed outside the permitted operating parameters (for permitted operating parameters, see chapter 9.2).

NOTE

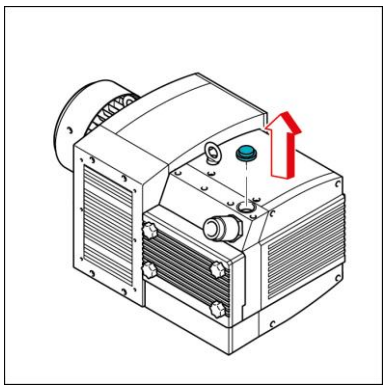
Fastening to the substrate

The pump can be installed on solid ground without anchoring. When installing on a static substructure, the built-in feet must be screwed in from below and thus fixed.

6.2 CONNECTING THE MEDIA LINE

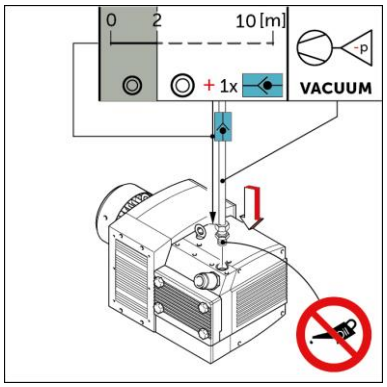
WARNING

When installing media lines that have a high temperature, please note that they must be covered, insulated and labelled accordingly to prevent injury and pump damage.



Remove the sealing plug

The suction connection is protected against the ingress of dirt and foreign bodies during transport with a sealing plug. This must be removed shortly before commissioning.



Dimensioning the suction line

The diameter of the suction line depends on the pump size and the line length.

There is an internal thread in the connection flange. Cables with a minimum diameter in accordance with the following table must be used.

Size	Connection	Cable cross-section (MIN)	
		Length ≤ 2 m	Length ≥ 2 m
KVT 3.60 / KVX 3.60	G 1	25 mm	32 mm
KVT 3.80 / KVX 3.80	G 1	25 mm	32 mm
KVT 3.100 / KVX 3.100	G 1½	38 mm	50 mm
KVT 3.140 / KVX 3.140	G 1½	38 mm	50 mm
PICCHIO 2200	G 1	25 mm	32 mm

Table: Dimensioning the suction line

ATTENTION

When using line lengths ≥ 2 m or directly connected pressure vessels, the air may flow back when the pump is switched off and cause the piston with the vanes to rotate in the opposite direction to the actual direction of rotation. This can damage the vanes (valve breakage)!

To safely prevent this, non-return valves must be installed as close as possible to the suction/pressure connection of the pump.

Keep connections free of oil, grease, water and other soiling.

The supply line must be installed mechanically stress-free using a flexible hose or rigid pipe.

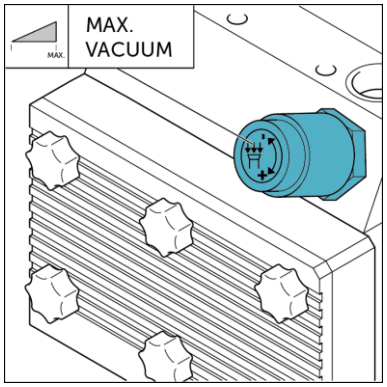
Exhaust air

The exhaust air is discharged via the blow-off valve (pos. 4).

Some variants have an additional exhaust air connection on the connection strip instead of the blow-off valve (same connection size as suction connection).

- The drain must be installed mechanically stress-free using a flexible hose or rigid pipe.
- It must be ensured that the extract air can flow out without major back pressure (see chapter 2.6).
- At high exhaust air temperatures, the exhaust air duct must be designed in such a way that it does not pose any danger.

6.3 SET VENTIL



Setting the vacuum

The pump is equipped with a vacuum regulating valve, which allows the vacuum required for the application to be set.

This value is limited depending on the size.

Information on this can be found in the chapter 9.2 "Operating parameters".

6.4 ELECTRICAL INSTALLATION

DANGER

Danger to life due to electric shock - Personnel qualification

DANGER

Danger to life due to defective, dismantled and manipulated protective devices

DANGER

Danger to life due to unexpected start-up

NOTE

For a detailed description of the safety instructions, see chapter 2 "Basic safety instructions".

The electrical installation of the pump must comply with the requirements of Directive 2006/42/EC and EN 60204.

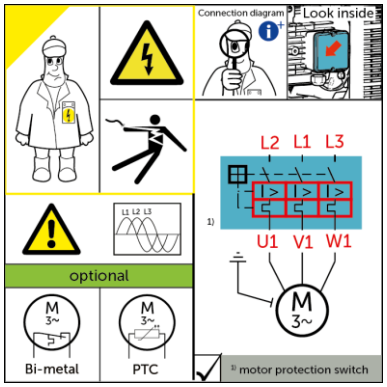
If the pump is integrated into a control system, it must be ensured that the pump does not restart automatically after an unintentional voltage drop. The measures against unexpected start-up in accordance with DIN EN ISO 14118 must be realised. This also applies after a shutdown following an emergency stop.

The following points must be observed when installing the pump:

The pump may be operated with a maximum of 10 start/stop cycles per hour.

- The pump supply line must meet the minimum requirements of the state of the art.

6.4.1 ELECTRICAL CONNECTION (STANDARD)

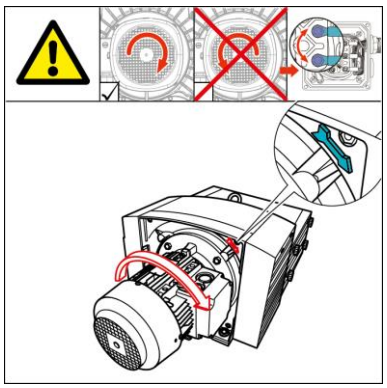


Connecting the motor

The motor must be connected in accordance with the wiring diagram (see terminal box cover).

The following points must be observed when installing the pump:

- The permissible connection types of the motor can be found on the motor rating plate.
- The pump must be protected by an overload protection (motor protection switch) that takes the service factor (SF) into account. Operation without appropriate protection is prohibited.
- An existing motor temperature protection (PTC, bimetal switch) must be connected.



Authorised direction of rotation of the pump

Before commissioning, check that the pump is rotating in the prescribed direction (observe the direction of rotation arrow on the lantern). To do this, only start the pump briefly (max. 3 seconds), as operation in the wrong direction of rotation will damage the pump.

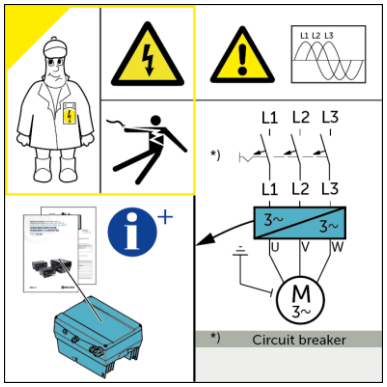
If the pump does not run in the specified direction of rotation (looking at the motor's fan wheel), this must be corrected by swapping two connection phases.

6.4.2 ELECTRICAL CONNECTION (VARIAIR KVT/KVX 3.XXX)

NOTE

For information on the frequency inverter, see additional instructions "VARIAIR frequency inverter"

www.becker-international.com/download

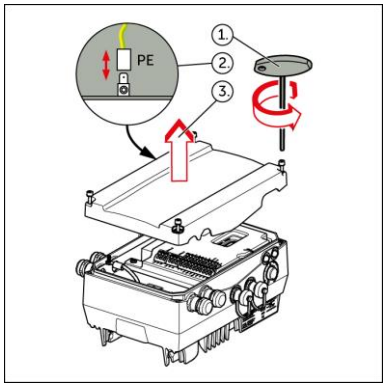


The following points must be observed when installing the pump:

- The connection from the frequency inverter to the motor has been pre-installed at the factory. This connection must not be changed.
- The frequency inverter must not be installed at a location other than the intended location.
- The pump must be protected by a suitable circuit breaker. Operation without an appropriate fuse is prohibited.

Frequency inverter	Triggering characteristics	Rated current
VAU 4/4	C	16 A
VAU B	C	16 A

Table: Circuit breaker

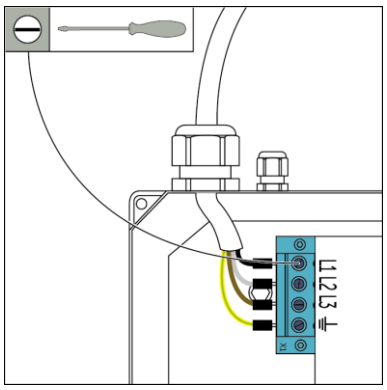


Connecting the frequency inverter

To access the connection terminal, the cover of the frequency inverter must be removed.

Proceed as follows:

1. Loosen the 4 fastening screws of the cover.
2. Disconnect the PE plug on the underside of the cover.
3. Remove cover
4. When closing the cover later, make sure that the PE plug is plugged back in.
5. Tighten the four screws on the cover using an Allen key. Observe the tightening torque (2 Nm).



The adjacent figure shows the terminal assignment for the supply line.

Further information on the correct cable cross-sections or stripping lengths can be found in the additional instructions for the inverter series.

6.5 SWITCH ON THE PUMP

The pump is switched on via switching elements in the application. After switching on, the pump switches directly to normal operating mode. There are no subordinate operating modes for set-up, maintenance or troubleshooting.

The pump may only be switched on when it has been properly installed, the electrical connection has been made correctly and the media lines have been connected.

When using a VARIAIR pump, it depends on the customer-specific parameterisation which additional measures (release, setpoint specification) are required to switch to normal operation.

6.6 NORMAL OPERATION

In normal operation, the pump operates fully automatically within its physical limits, in accordance with the customer's control system.

6.7 SWITCH OFF THE PUMP

1. shutdown

To switch off, the pump must be shut down from the application and secured against being switched on again.

In addition, a warning sign must be attached to the mains disconnection device.

All electrical equipment must be disconnected individually. Maintenance during operation or when the pump is switched on is strictly prohibited.

2. disconnection from the power supply

A qualified electrician switches the motor off and disconnects it. After carrying out the 5 safety rules, non-qualified electricians may also carry out work on the pump.

After completion of the activities, the activities under the point: "Recommissioning" must be followed.

6.8 RECOMMISSIONING

After the storage and shutdown period, the pump must be checked to ensure that it is operational. If it is not operational, appropriate maintenance and servicing measures must be carried out to restore its operational capability.

The following points must be worked through in the specified order to enable the pump to be safely recommissioned:

1. The pump must be serviced, cleaned and, if necessary, repaired in accordance with the chapters "Servicing and maintenance" and "Cleaning".
2. The electrical connection must be carried out in accordance with chapter 6.3. The power supply must not yet be restored.
3. All safety devices must be fitted and checked for functionality and effectiveness. Damaged parts must be replaced immediately.

After completing the above points and taking into account the section "Switching on the pump", see chapter 6.5, the pump can be put back into operation.

7 TROUBLESHOOTING/TROUBLESHOOTING

DANGER
Danger to life due to electric shock - Personnel qualification

DANGER
Danger to life due to defective, dismantled and manipulated protective devices

DANGER
Danger to life due to unexpected start-up

WARNING
Danger from hot components and equipment

WARNING
Risk of injury due to slipping, tripping

NOTE
For a detailed description of the safety instructions, see chapter 2 "Basic safety instructions".

If troubleshooting is carried out immediately after operation, the cooling time must be observed.

Troubleshooting on the pump is only permitted under the following conditions:

Shutdown

For troubleshooting, the pump must be shut down and secured against being switched on again. In addition, a warning sign must be attached to the mains disconnection device.

All existing electrical equipment must be individually disconnected.

If safety devices have to be dismantled or modified for troubleshooting purposes, they must be refitted, adjusted and tested after the maintenance and servicing work has been completed and before the pump is started.

A qualified electrician may then carry out work on the pump.

Once the work has been completed, the pump may be put back into operation after a visual inspection.

When troubleshooting, check the pump for defects in particular.

- Damage, in particular to:
  - Ventilation grilles
  - Screw connections
  - Media lines
  - Electrical cables
- Leaks
- Loose objects
- Loose screw connections or fastenings
- Contact protection on live parts.

NOTE
Visual inspection: The pump is free of foreign objects. After an initial inspection, the pump is free of damage. This also includes checking the electrical and pneumatic components and connections.

Instruct unauthorised persons to leave the pump.

If defects and hazards become apparent during the inspection, the pump must be shut down immediately. The pump may only be put into operation if it is in perfect condition.

The chapter 8.1 "Maintenance and servicing" must be followed.

7.1 FAULT TABLES

The following tables describe possible causes of faults and the activities required to rectify them. In the event of faults that cannot be rectified using the following instructions, please contact Gebr. Becker.

The pump does not reach the required vacuum		
Possible cause	Review	Troubleshooting
Leakage in the supply line	Visual inspection of the supply line elements (e.g. pipework, fitting, hose clamps)	Replacing the faulty supply line elements
Slider worn out	Visual inspection for damage Measure slider width	Remove the slider, check and replace if damaged or if the minimum width is not reached
Filter dirty	Check filter contamination	Clean / replace filter
Resistance in the supply line too high	Check the dimensions of the supply line	Carry out dimensioning in accordance with the operating instructions. Further support from BECKER Service
Resistance in the supply line too high	Check supply lines for blockages, kinks and deformations	Remove foreign objects from the media line. Repair supply lines if necessary
Resistance in the supply line too high	Check throttle elements for opening condition	Open throttle elements if necessary
The motor runs in the wrong direction of rotation if the pump does not prime correctly and emits loud noises	Check the direction of rotation using the direction of rotation arrow	The motor installation must be corrected by a qualified electrician.

Table: Fault tables: The pump does not reach the required vacuum

The pump does not start		
Possible cause	Review	Troubleshooting
Supply voltage is not present	Electrical protective devices (e.g. Motor protection switch, fuses, emergency stop)	Identified fault rectified by a qualified electrician
Supply voltage is not present	Check electrical connection cable	Repairing the connecting cable
Supply voltage is not present	Check the electrical connection	Identified fault rectified by a qualified electrician
VARIAIR variant: Frequency inverter is in fault state. fault state	Red LED on the inverter lights up	Troubleshooting according to the operating instructions for the inverter
VARIAIR variant: Activation faulty	Check control signals (e.g. enable, setpoint, field bus)	Set control signals (e.g. enable, setpoint, field bus) as required
Pump mechanically blocked	Rule out electrical causes. Check the free movement of the motorised fan (with a screwdriver)	Contact BECKER Service

Table: Fault tables: The pump does not start

The pump becomes unusually hot		
Possible cause	Review	Troubleshooting
Motor/appliance fan damaged or clogged	Visual inspection for visual damage. Listen for unusual noises (e.g. grinding noises)	The pump must be safely shut down or disconnected from the supply voltage by a qualified electrician. The "fan cover" protective device must be removed and the fan wheel cleaned of dirt or replaced if damaged.
Temperature of the evacuated gas is too high	Measure the temperature of the evacuated gas and compare it with the permitted maximum temperature (chapter 9.2).	This temperature limit must be observed.
Filter dirty	Check filter contamination	Clean / replace filter
Ambient temperature of the pump is too high	Measure ambient temperature	Sufficient ventilation and compliance with the minimum distances must be checked and ensured.

Table: Fault tables: The pump becomes unusually hot

8 MAINTENANCE, SERVICING AND DISMANTLING

DANGER

Danger to life due to electric shock - Personnel qualification

DANGER

Danger to life due to defective, dismantled and manipulated protective devices

WARNING

Danger from hot components and equipment

NOTE

For a detailed description of the safety instructions, see chapter 2 "Basic safety instructions".

NOTE

Wear suitable PPE

If a maintenance activity requires the dismantling of protective devices, these may only be dismantled for the duration of the maintenance activity. Immediately after completion of the maintenance work, all protective devices must be fully installed in the designated position and checked for proper functioning.

The prescribed inspection intervals for protective devices must be observed and complied with. Protective devices may only be maintained, replaced and serviced by trained, instructed and authorised specialist personnel.

Safety-related parts of the pump could be damaged or disabled by unauthorised tampering or manipulation. Unauthorised tampering and manipulation of the safety-related parts of the pump, adjustable components, is strictly prohibited and must be reported immediately to the responsible body.

8.1 MAINTENANCE AND SERVICING

As a prerequisite for safe and proper operation, it is essential that the pump is inspected, serviced and maintained by suitably qualified personnel at regular intervals. In addition, regular maintenance and servicing increases the availability and extends the service life of the pump. The recommended service and maintenance intervals are listed in this chapter.

Under very unfavourable operating conditions, it may be necessary to adjust the maintenance intervals and the time of inspection accordingly.

8.2 PREPARATION

The responsibilities for installation, operation, maintenance and cleaning must be clearly regulated and defined.

For maintenance and servicing measures, it must be ensured that sufficient space is available for all work. The maintenance area must be secured.

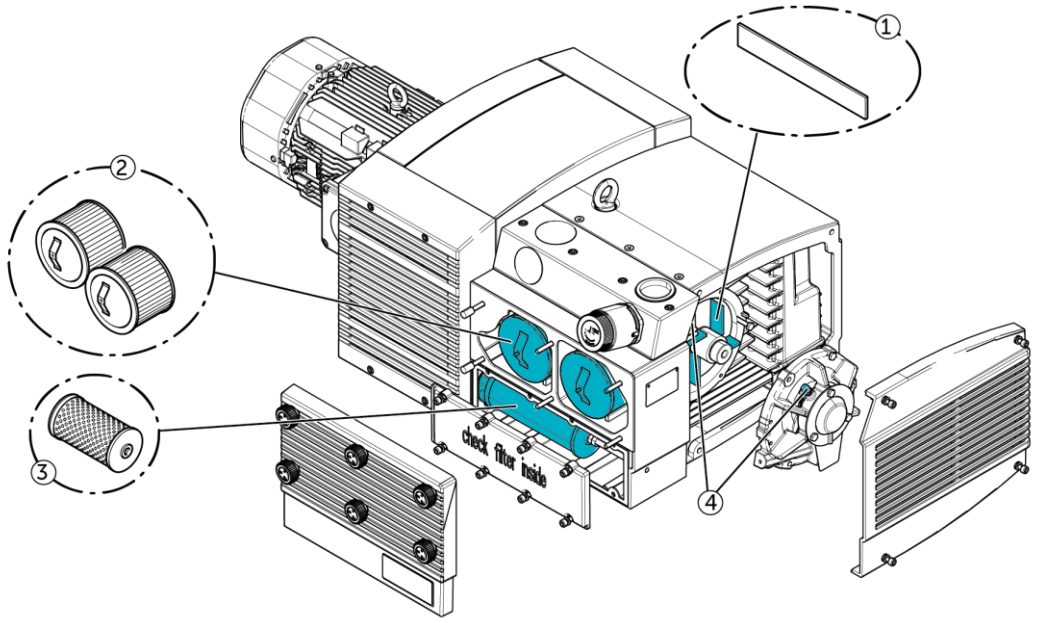
The following steps must be observed when preparing for servicing and maintenance work:

1. All existing electrical equipment must be individually disconnected. Maintenance during operation or when the pump is switched on is strictly prohibited.
2. If safety devices have to be dismantled or modified, they must be refitted, adjusted and tested immediately after completion of the maintenance and servicing work and before the pump is started.
3. After this, a qualified electrician may carry out work on the pump, taking into account the 5 safety rules.

Once the work has been completed, the pump may be put back into operation after a visual inspection.

8.3 MAINTENANCE INTERVALS

The maintenance intervals are shown in the following overview:



8.3.1 KVT 3.60-140 SERIES + PICCHIO 2200

Component	40 - 200 h	2000 h (min. 2x/1a)	3000 h	8000 h (min. 1x/3a)
Rotary vane (1)			measure, change	
Intake filter (2)	check, clean	change		
C separator (3)	check, clean	change		
Camp (4)		relubricate	relubricate	
Housing	clean			
Pump fans		check, clean		
Coupling / sprocket		check		
Safety and protective devices	Check whether complete and intact			
Inspection				Inspection by the Gebr. Becker service - arrange an appointment

Table: Maintenance intervals

8.3.2 KVX 3.60-140 SERIES

Component	40 - 200 h	2000 h (min. 2x/1a)	7500 h	20000 h (min. 1x/5a)
Rotary vane (1)			measure, change	
Intake filter (2)	check, clean	change		
C separator (3)	check, clean	change		
Camp (4)		relubricate	relubricate	
Housing	clean			
Pump fans		check, clean		
Coupling / sprocket		check		
Safety and protective devices	Check whether complete and intact			
Inspection				Inspection by the Gebr. Becker service - arrange an appointment

Table: Maintenance intervals

We are happy to support our customers in this work and in assessing the condition of the equipment with the help of our BECKER service. We always recommend an on-site consultation for large pumps.

8.4 MAINTENANCE ACTIVITIES

DANGER
Danger to life due to defective, dismantled and manipulated protective devices

WARNING
Danger from hot components and equipment

NOTE
For a detailed description of the safety instructions, see chapter 2 "Basic safety instructions".

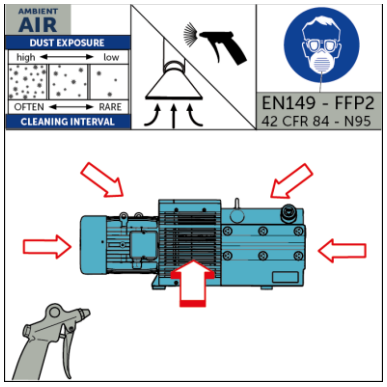
NOTE
Wear suitable PPE

The safety instructions must always be observed:

- Use suitable tools and handle with care.
- Personal protective equipment must be used to prevent injuries caused by tools or components.
- The maintenance area must be kept clean and tidy. Objects lying around can pose a tripping hazard.
- If anything is unclear, the responsible body or the manufacturer should be consulted.

The maintenance plan provides for the following activities:

8.4.1 VACUUM / CLEAN SURFACE WITH COMPRESSED AIR



Clean the surface with compressed air

The pump must be cleaned regularly. The interval depends on the degree of soiling on the housing.

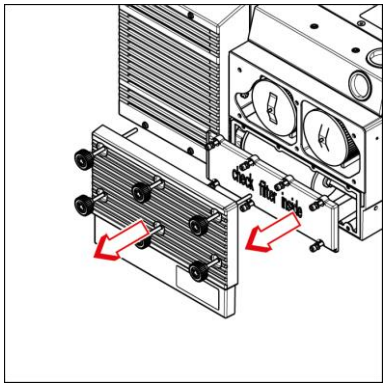
Protective goggles and an FFP2 mask in accordance with EN 149:2008 must be worn during cleaning.

Cleaning the frequency inverter

With the VARIAIR variant, the frequency inverter must also be cleaned.

Do not use compressed air to remove dirt from the fan openings, but use a vacuum cleaner.

8.4.2 CLEAN FILTER



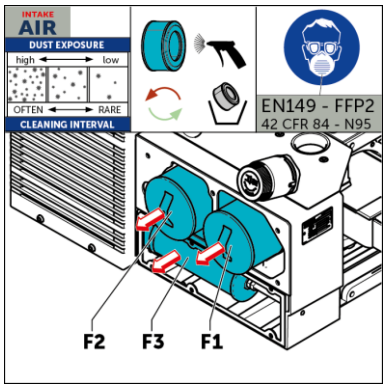
The filter cartridges are installed behind the filter cover, which is fastened with 4 or 6 grip screws.

The C-separator is located behind another cover. Loosen this, remove the filter cartridges and blow through with compressed air from the inside to the outside.

If the filters are still restricted in their function after the cleaning process (clogged, oily, greasy or damaged), they must be replaced.

The filter cover seal must also be checked and replaced if it is recognisably damaged.

Only original spare parts from Gebr. Becker may be used.



Intake filter - F1

The filter cartridge becomes clogged depending on the degree of contamination of the intake air. It must be cleaned at the aforementioned intervals, at least

but every 200 hours, cleaned with compressed air.

Protective goggles and an FFP2 mask in accordance with EN 149:2008 must be worn during cleaning.

Intake filter - F2 (KVT/KVX 3.100+3.140 only)

The pump requires a small amount of additional air (bypass) to optimise the flow. This intake filter is not used as much but must also be cleaned.

C separator filter - F3

The rotary vanes used are essentially made of graphite and are subject to wear, which is reflected in the process air in the form of carbon dust. The same interval times must be taken into account here.

Proceed as follows to clean the filter cartridge, depending on how it is installed:

1st paper filter cartridge (standard)

- blow through with compressed air from the inside to the outside. Ensure that there is sufficient clearance, as an excessively hard air flow can damage the filter material.

2. polyester filter cartridge (required for KVT 3.XXX/6)

- First remove coarse dirt from the filter by lightly tapping it out.
- Carefully rinse the filter from the inside out with a not too hard jet of water. For stubborn dirt, we recommend soaking the filter in a mild soap-based cleaning bath.
- Shake the excess water out of the filter and allow it to dry out completely in the air; when drying with compressed air, ensure that there is sufficient clearance, as too hard a flow of air can damage the filter material.

ATTENTION

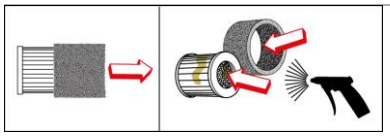
Risk of sticking or mould!

Always allow polyester filters to dry after cleaning with water.

If the function of the filter is restricted even after the cleaning process (clogged, oily, greasy or damaged), it must be replaced. It should be replaced after one year at the latest.

NOTE

The intake filters installed in the X series have a removable cover (pre-filter), which extends the service life of the filters when cleaned regularly.



To clean, remove the pre-filter from the actual intake filter and blow off both filters with compressed air.

8.4.3 CHECK ROTARY VANES

ATTENTION

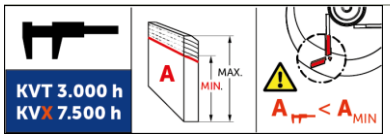
The minimum valve widths must be observed, otherwise the valves may break and damage the pump.

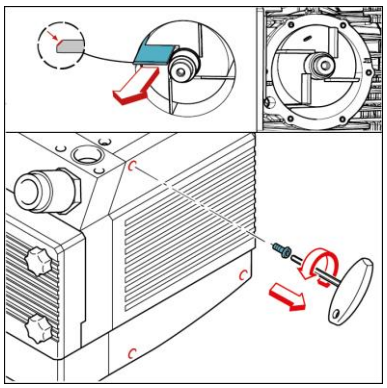
ATTENTION

The X series sliders are not compatible with the standard series.

NOTE

The X series with specially developed sliders achieves improved slider service life due to less abrasion.





The sliders are installed behind the air guide bonnet. Undo the screws and remove the cover.

The side cover underneath is fastened with 6 hexagon socket screws. Loosen these and set aside.

To remove the side cover, 2 of the previously loosened screws must be screwed evenly into the threaded holes provided in the side cover. The side cover pushes away from the housing.

Pull the sliders out of the slider grooves of the piston.

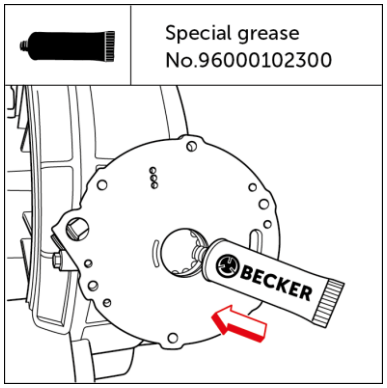
Visually check for damage and measure the valve width, replace the valve if necessary.

When reinstalling the sliders, ensure that they are installed in the correct position.

Blow out the housing with dry compressed air.

Slide widths:

Size	Minimum width	Size	Minimum width
KVT 3.60	21 mm	KVX 3.80	26 mm
KVT 3.80	26 mm	KVX 3.100	26 mm
KVT 3.100	26 mm	KVX 3.140	31 mm
KVT 3.140	31 mm	Picchio 2200	31 mm
KVX 3.60	21 mm		

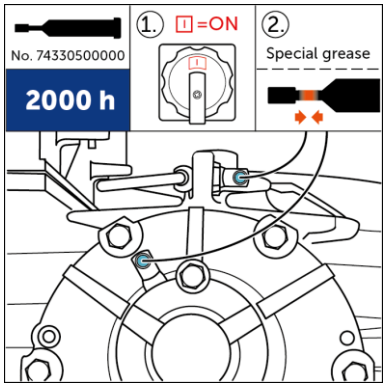


Before reassembly, wipe the piston end with a clean cloth.

As small amounts of grease are also wiped off in the process, it is necessary to replace the grease loss in pumps that are lubricated for life (KVT/KVX 3.60+3.80, Picchio 2200).

Only original spare parts and lubricants from Gebr. Becker may be used.

8.4.4 BEARING LUBRICATION (KVT/KVX 3.100+3.140)



The pump must be relubricated at regular intervals.

The two lubrication points are located behind the air guide cover. Undo the screws and remove the cover.

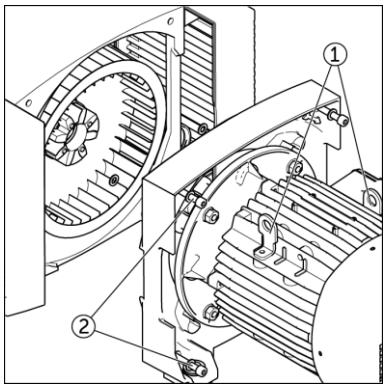
For optimum grease distribution, the pump must be re-greased during operation.

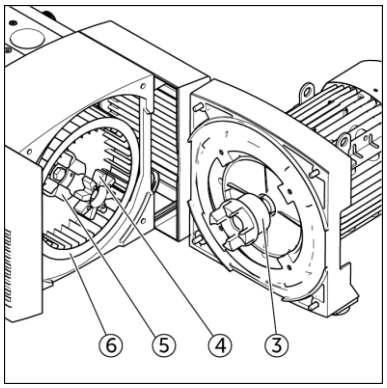
Switch on the pump and fill with the Becker grease gun.

Series	Number of strokes/grease nipples
KVT/KVX 3.100	10
KVT/KVX 3,140	15
1 stroke ≈ 0.5g fat	

Table: Bearing lubrication

8.4.5 CHECK CLUTCH AND FAN





The spider of the clutch is subject to wear and must be checked regularly.

In this area, there are also other maintenance activities that need to be taken into account at the same intervals.

1. Ensure that all requirements for maintenance operation have been met
2. Attach the hoist to the transport lugs (1) of the motor
3. Loosen the 4 nuts (2) on the intermediate flange and pull it off axially together with the motor
4. Check both coupling halves (3+5) and the spider (4) for damage (e.g. cracks in the spider) and wear, replace if necessary
5. Visually inspect the pump fan (6). In the event of visible damage, replacement is urgently required. Support is available from our BECKER service centre
6. Installation is carried out in reverse order. Ensure that the two coupling halves are correctly centred.

8.5 MEDIA LINES

WARNING

Risk of injury due to stored residual energy

Lines, hoses, pipes, valves and connections must be checked for damage (leaks) at regular intervals.

The following instructions must be observed when carrying out maintenance and repair work on media lines:

- Before starting work on the media lines, the system must be depressurised and secured against being switched on again. Residual energy must be dissipated or discharged. Residual liquids in media lines must be drained off.

8.6 CONDITIONS FOR SWITCHING ON AGAIN

The following points must be observed before restarting after maintenance and servicing work:

- Unauthorised persons must be removed from the pump.
- The proper connection between the pump and the media lines must be checked.
- The media lines must be checked for leaks and damage.
- The power supply must be checked for damage and proper functioning.
- All protective devices must be present, functional and tested.

8.7 SPARE AND WEAR PARTS

WARNING

Safety risk due to spare parts not approved by the manufacturer

A comprehensive spare parts list with all spare and wear parts for the series listed here can be found on our homepage under the following link:

www.becker-international-shop.com

8.8 TEMPORARY SHUTDOWN

The following steps must be observed during a temporary shutdown:

1. Shutdown
2. To switch off the pump, it must be shut down and secured against being switched on again. In addition, a warning sign must be attached to the mains disconnection device.
3. All existing electrical equipment must be individually disconnected.
4. Disconnection from the power supply
5. A qualified electrician switches the motor off and disconnects it. After carrying out the 5 safety rules, non-qualified electricians may also carry out work on the pump.
6. After completion of the decommissioning, the activities under "Recommissioning" must be followed.

8.9 CLEANING

DANGER

Danger to life due to defective, dismantled and manipulated protective devices

DANGER

Danger to life due to unexpected start-up

WARNING

Danger from hot components and equipment

WARNING

Risk of injury due to slipping, tripping

ATTENTION

Incorrect cleaning, for example by using the wrong cleaning agents or cleaning equipment (e.g. high-pressure cleaner), can cause damage to the pump.

NOTE

For a detailed description of the safety instructions, see chapter 2 "Basic safety instructions".

NOTE

Wear suitable PPE

The entire pump must be cleaned at regular intervals depending on the amount of dust. This includes cleaning all surfaces of the pump with a compressed air gun and a moistened cleaning cloth.

The cleaning instructions of the manufacturers of components and assemblies must be observed.

The use of solvents or cleaning agents containing solvents is prohibited.

The use of cleaning agents that are highly flammable or generally flammable is prohibited!

The statutory environmental protection regulations must be observed during cleaning.

The pump may only be switched on again if there is no damage to the pump and no person is exposed to danger.

8.10 DISMANTLING AND DECOMMISSIONING

DANGER

Danger to life due to electric shock - Personnel qualification

DANGER

Danger to life due to unexpected start-up

WARNING

Danger from hot components and equipment

WARNING

Risk of injury due to slipping, tripping

NOTE

For a detailed description of the safety instructions, see chapter 2 "Basic safety instructions".

NOTE

Wear suitable PPE

The following steps must be observed during dismantling and decommissioning:

1. Switch off the pump and enable the drive.
2. Switch off the power supply and secure it against unintentional restarting.
3. Disconnect the supply line of the drive.
4. Shut off media lines and discharge pressure differences if necessary.
5. Disconnect the media lines from the pump.
6. Dismantle the pump in reverse order of assembly or according to the separate dismantling instructions. Loose parts must be secured to prevent them from tipping over or falling.
7. Protect the pump from further contamination
8. Clean the pump thoroughly

8.11 STORAGE

The following requirements for the storage location must be observed in order to store the unused pump in a proper condition over a longer period of time. If the following requirements are not observed, damage to the pump may occur.

- the storage location must be dry and clean
- the storage location must be level
- the storage location must be protected from sudden changes in temperature and humidity
- the storage location must be protected from salt spray, industrial gases, corrosive liquids, rodents and fungal infestation

Restocking

If the pump is to be stored for a longer period of time (more than two months) after use, the following steps must be observed.

1. Ensure that the pump is free of water or water vapour.
2. To do this, close the intake. Set the vacuum regulating valve to the maximum vacuum.
3. Allow the pump to run for 30 minutes after reaching operating temperature. Only draw in a small amount of dry ambient air.
4. Immediately after switching off the pump, seal all inlets and outlets with sealing plugs.
5. Silica gel packets must be placed inside the filter housing. Attach warning stickers to ensure that the packets are removed before commissioning.

ATTENTION

If the pump was pumping air with a high moisture content before the shutdown period, the above steps are also recommended for shorter storage periods

8.12 WASTE DISPOSAL

NOTE

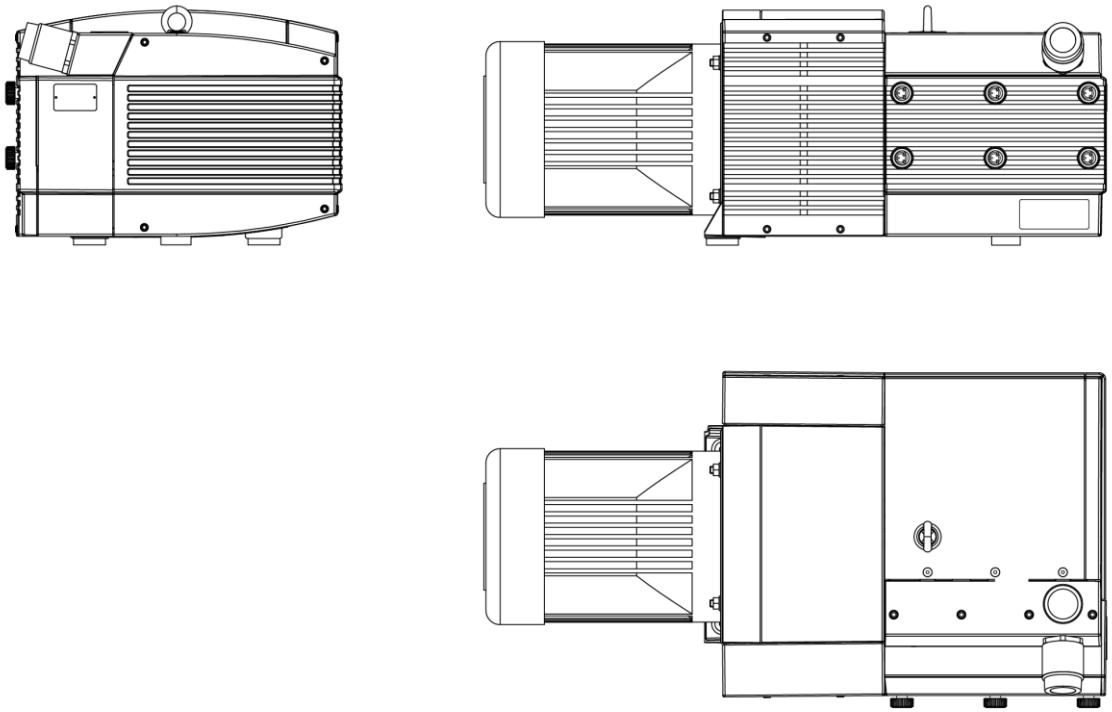
For a detailed description of the safety instructions, see chapter 2 "Basic safety instructions".

The pump is disposed of in a disassembled state. See chapter 8.10.

When disposing of the pump, the relevant local environmental regulations must be observed.

9 PRODUCT DATA SHEET

9.1 PRODUCT OVERVIEW



9.2 OPERATING PARAMETERS

9.2.1 KVT SERIES

Variant	KVT 3.60	KVT 3.80	KVT 3.100	KVT 3.140
Volume flow 1 max.	55 m^3/h (50 Hz)	67 m^3/h (50 Hz)	98 m^3/h (50 Hz)	129 m^3/h (50 Hz)
Volume flow 2 max.	66 m^3/h (60 Hz)	78,5 m^3/h (60 Hz)	112 m^3/h (60 Hz)	154 m^3/h (60 Hz)
Vacuum	100 mbar (abs.)	100 mbar (abs.)	100 mbar (abs.)	100 mbar (abs.)
Weight	76 - 84 kg	78 - 86 kg	100 - 108 kg	112 - 142,5 kg
Sound pressure level 1 max.	71 dB(A) (50 Hz)	72 dB(A) (50 Hz)	75 dB(A) (50 Hz)	76 dB(A) (50 Hz)
Sound pressure level 2 max.	73 dB(A) (60 Hz)	75 dB(A) (60 Hz)	77 dB(A) (60 Hz)	79 dB(A) (60 Hz)
Permissible ambient temperature	5 - 45 °C	5 - 45 °C	5 - 45 °C	5 - 45 °C
Exhaust air temperature max.	40 °C	53 °C	78 °C	77 °C
Maximum installation height	800 m ü.NN.	800 m ü.NN.	800 m ü.NN.	800 m ü.NN.
Maximum humidity of the intake air	90 %	90 %	90 %	90 %

Table: Operating parameters

Variant	Picchio 2200
Volume flow 1 max.	78 m^3/h (50 Hz)
Volume flow 2 max.	89 m^3/h (60 Hz)
Vacuum	100 mbar (abs.)
Weight	78 - 86 kg
Sound pressure level 1 max.	76 dB(A) (50 Hz)
Sound pressure level 2 max.	79 dB(A) (60 Hz)
Permissible ambient temperature	5 - 45 °C
Exhaust air temperature max.	65 °C
Maximum installation height	800 m ü.NN.
Maximum humidity of the intake air	90 %

Table: Operating parameters

9.2.2 KVT SERIES (VARIAIR)

Variant	VARIAIR KVT 3.80	VARIAIR KVT 3.100	VARIAIR KVT 3.140
Volume flow 1 max.	38 m^3/h (30 Hz)	55 m^3/h (30 Hz)	- m^3/h (- Hz)
Volume flow 2 max.	76 m^3/h (60 Hz)	112 m^3/h (60 Hz)	145 m^3/h (60 Hz)
Vacuum	100 mbar (abs.)	100 mbar (abs.)	100 mbar (abs.)
Weight	88,5 kg	109,5 kg	115,5 kg
Sound pressure level max.	67 dB(A) (60 Hz)	77 dB(A) (40 Hz)	77,9 dB(A) (40 Hz)
Permissible ambient temperature	5 - 45 °C	5 - 45 °C	5 - 45 °C
Exhaust air temperature max.	57 °C	60 °C	74 °C
Maximum installation height	800 m ü.NN.	800 m ü.NN.	800 m ü.NN.
Maximum humidity of the intake air	90 %	90 %	90 %

Table: Operating parameters

9.2.3 KVX SERIES

Variant	KVX 3.60	KVX 3.80	KVX 3.100	KVX 3.140
Volume flow 1 max.	55 m^3/h (50 Hz)	67 m^3/h (50 Hz)	98 m^3/h (50 Hz)	129 m^3/h (50 Hz)
Volume flow 2 max.	66 m^3/h (60 Hz)	78,5 m^3/h (60 Hz)	112 m^3/h (60 Hz)	154 m^3/h (60 Hz)
Vacuum	100 mbar (abs.)	100 mbar (abs.)	100 mbar (abs.)	100 mbar (abs.)
Weight	76 - 84 kg	78 - 86 kg	100 - 108 kg	112 - 142,5 kg
Sound pressure level 1 max.	71 dB(A) (50 Hz)	72 dB(A) (50 Hz)	75 dB(A) (50 Hz)	76 dB(A) (50 Hz)
Sound pressure level 2 max.	73 dB(A) (60 Hz)	75 dB(A) (60 Hz)	77 dB(A) (60 Hz)	79 dB(A) (60 Hz)
Permissible ambient temperature	5 - 45 °C	5 - 45 °C	5 - 45 °C	5 - 45 °C
Exhaust air temperature max.	40 °C	53 °C	78 °C	77 °C
Maximum installation height	800 m ü.NN.	800 m ü.NN.	800 m ü.NN.	800 m ü.NN.
Maximum humidity of the intake air	90 %	90 %	90 %	90 %

Table: Operating parameters

9.2.4 KVX SERIES (VARIAIR)

Variant	VARIAIR KVX 3.80	VARIAIR KVX 3.100	VARIAIR KVX 3.140
Volume flow 1 max.	38 m^3/h (30 Hz)	55 m^3/h (30 Hz)	- m^3/h (- Hz)
Volume flow 2 max.	76 m^3/h (60 Hz)	112 m^3/h (60 Hz)	145 m^3/h (60 Hz)
Vacuum	100 mbar (abs.)	100 mbar (abs.)	100 mbar (abs.)
Weight	88,5 kg	109,5 kg	115,5 kg
Sound pressure level max.	67 dB(A) (60 Hz)	77 dB(A) (40 Hz)	77,9 dB(A) (40 Hz)
Permissible ambient temperature	5 - 45 °C	5 - 45 °C	5 - 45 °C
Exhaust air temperature max.	57 °C	60 °C	74 °C
Maximum installation height	800 m ü.NN.	800 m ü.NN.	800 m ü.NN.
Maximum humidity of the intake air	90 %	90 %	90 %

Table: Operating parameters

9.3 TECHNICAL DATA

Technical data sheets for the pumps can be found on our homepage under the following link:

www.becker-international.com/download

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